Claims

1. A method for the contactless scanning of three-dimensional objects (1) by means of a collimated light beam (7), preferably by means of a laser beam, in which the object (1) is scanned by at least two different measuring sections and the measurement values of the measuring sections are combined, wherein the lines (G1 - G4) of the measurement points of two different measuring sections are not parallel and/or the object (1) rotates in one measuring section and not in the other in the case of two different measuring sections.

2. The method as claimed in claim 1, characterized in that the light beam (7) is directed to the object (1) via a mirror arrangement (5).

3. The method as claimed in claim 1 or 2, characterized in that the object is tilted in at least one measuring section compared with the position of an earlier measuring section.

4. The method as claimed in one of claims 1 to 3, characterized in that the object (1) is scanned in at least one measuring section while it is rotating about an axis of rotation (A1), wherein the light source (2) and/or a mirror arrangement (5) are moved relative to one another for deflecting the light beam and the object (1) so that the measurement points extend along a line (G1, G2) on the surface of the object (1).

5. The method as claimed in one of claims 1 to 4, characterized in that the light beam (7) is moved in approximately parallel lines (G3, G4) over the non-rotating object (1) in at least one measuring section.

6. The method as claimed in one of claims 1 to 5, characterized in that the light beam (7) is moved over the non-rotating object (1) in zigzag-shaped lines, the peaks of which can be located outside the object (1), in at least one measuring section.

7. The method as claimed in one of claims 1 to 6, characterized in that the laser light (7) is directed onto the object (1) at different angles (α) with respect to the surface of the object (1).

8. The method for the contactless scanning of three-dimensional objects (1) by means of a collimated light beam (7), particularly a laser beam, especially in accordance with a method as claimed in one of claims 1 to 7, wherein at least one reference object (R) outside the object (1) is also scanned additionally to the object (1) in predetermined measuring sections.

9. The method as claimed in claim 8, characterized in that a predetermined part of a device (4) for holding the object (1) is also scanned as reference object (R).

10. The method for the contactless scanning of three-dimensional objects (1) by means of a collimated light beam (7), particularly a laser beam, especially in accordance with a method as claimed in one of Claims 1 to 9, characterized in that an auxiliary signal is generated which contains information on the surface characteristic of the object (1) and/or about the characteristics of the light beam (7) impinging on the object (1).

11. The method as claimed in claim 10, characterized in that the auxiliary signal is generated by means of a preferably color-sensitive light receiver (3, 3'), particularly by means of a camera, especially preferably a CCD camera.

12. The method as claimed in claim 10 or 11, characterized in that measurement values are discarded on the basis of their signal strength and/or on the basis of the information contained in the auxiliary signal.

13. The method as claimed in one of claims 10 to 13, characterized in that the light intensity of the light beam (7) is varied on the basis of the information contained in the auxiliary signal.

14. The method as claimed in one of the preceding claims, characterized in that the object (1) is scanned at least once when rotating and at least once when not rotating, in that the object (1) is tilted in at least one measuring section compared with the position of an earlier measuring section, that the light beam (7) is directed to the object (1) via a rotatable mirror arrangement (5) and in that a part of the holding device (4) is also scanned for referencing in each measuring section.

15. A scanning arrangement for the contactless scanning of three-dimensional objects (1) which comprises a transmitter (2) for emitting collimated light beams (7), particularly laser beams, and a receiver (3) for detecting light signals (8), a holding device (4) for receiving the object (1) and is or can be connected to a control and computing arrangement (6), wherein a deflection arrangement (4, 5, 23a) for deflecting the light beam (7) over the surface of the object (1) is provided, by means of which the object (1) can be scanned by at least two different measuring sections, wherein the lines (G1 - G4) of the measurement points are not parallel in two different measuring sections and/or the object rotates during one measuring section and does not during the other one.

16. A scanning arrangement as claimed in claim 15, characterized in that the holding device (4) for the object is rotatable about an axis of rotation (A1).

17. The scanning arrangement as clamed in claim 15 or 16, characterized in that, for one measuring section, an arrangement for tilting the object (1) compared with the position of the object (1) in another measuring section is provided.

18. The scanning arrangement as claimed in one of claims 15 to 17, characterized in that the incident light beam (7) and the holding device (4) can be adjusted relative to one another in such a manner that the light beam (7) can be directed over the entire object (1).

19. The scanning arrangement as claimed in one of claims 15 to 18, characterized in that the deflection arrangement (4, 5, 23) is provided for directing the light beam (7) in approximately parallel lines (G3, G4) over the non-rotating object (1).

20. The scanning arrangement as claimed in one of claims 15 to 19, characterized in that the deflection arrangement (4, 5, 23) is provided for directing the light beam (7) in approximately zigzag-shaped lines over the non-rotating object (1), wherein the reversing points of the zigzag line can lie outside the object (1).

21. The scanning arrangement as claimed in one of claims 15 to 20, characterized in that the deflection arrangement (4, 5, 23) is provided for directing the light beam (7) over the object at different angles (α) to the surface of the object.

22. The scanning arrangement for the contactless scanning of three-dimensional objects (1) which comprises a transmitter (2) for emitting collimated light beams (7), particular laser beams, and a receiver (3) for detecting light signals (8), and a holding device (4) for accommodating the object (1), particularly as claimed in one of claims 15 to 21, characterized in that a mirror arrangement (5) for deflecting the light beam (7) to the object (1) is provided.

23. The scanning arrangement as claimed in claim 22, characterized in that the mirror arrangement (5) comprises a number of mirrors (S1 - S4) which are arranged to be rotatable about a common axis (A2).

24. The scanning arrangement as claimed in claim 23, characterized in that mirrors (S1 - S4) of the mirror arrangement (5) are mounted at different angles (γ) to the axis of rotation (A2) of the mirror arrangement (5).

25. The scanning arrangement as claimed in claim 22 or 23, characterized in that the mirrors (S1 - S4) of the mirror arrangement (5) can be subdivided into at least two identical groups, wherein all mirrors (S1 - S4) within each group are mounted at different angles (γ) to the axis of rotation (A1) and the groups are arranged following one another around the axis of rotation (A1).

26. The scanning arrangement for the contactless scanning of three-dimensional objects (1) which comprises a transmitter (2) for emitting collimated light beams (7), particularly laser beams, and a receiver (3) for detecting light signals (8) and exhibits a holding device (4) for accommodating the object (1), especially as claimed in one of claims 14 to 23, characterized in that an arrangement for generating an auxiliary signal is provided which contains information about surface characteristics of the object (1) and/or about the characteristics of the scanning light beam (7) on the object (1).

27. The scanning arrangement as claimed in claim 26, characterized in that a preferably color-sensitive light receiver, particularly a camera, preferably a CCD camera (3') is provided for detecting the light intensity, the geometric shape and/or the extent of the light beam on the surface of the object (1) and/or of the color and/or the value of reflectivity of the surface of the object in the area of the light beam on the object as a criterion for generating the auxiliary signal.

28. The scanning arrangement as claimed in claim 26 or 27, characterized in that the auxiliary signal and the measurement signal can be detected in the same receiver.

29. The scanning arrangement for the contactless scanning of three-dimensional objects (1) which comprises a transmitter for emitting collimated light beams (7), particularly laser beams, and a receiver (3) for detecting light signals (8), and exhibits a holding device (4) for accommodating the object (1), especially as claimed in one of claims 16 to 26, characterized in that the arrangement has at least one reference object (R) for referencing the measurement points, which is unambiguous, where at least one reference object (R) can be scanned in predetermined measuring sections.

30. The scanning arrangement as claimed in claim 29, characterized in that at least one reference object (R) is located on the holding device (4) or is formed by a part of the holding device (4).

31. The scanning arrangement as claimed in one of claims 29 or 30, characterized in that the reference object (R) is formed by a conical area (1') on the holding device (4).

32. The scanning arrangement as claimed in one of claims 29 to 31, characterized in that at least one reference object (R) is formed by an at least partially spherical body (K).

33. A holding device (4) for an object (1) in a scanning arrangement, particularly as claimed in one of claims 15 to 32, which has a holding arrangement (40, 40a) which holding device (4) is rotatable about an axis of rotation (A1), and which is provided with a tilting device (47, 50, M1, M3) for tilting the holding arrangement (40, 40a) by a predeterminable angle (φ) with respect to the axis of rotation (A1), wherein the tilting device (47, 50, M1, M3) has a switch-over arrangement (47, 50) for displacing the holding arrangement (40, 40a) between different positions, which is provided with an operating element (47) which can be operated by rotating the holding device (4).

34. The holding device (4) as claimed in claim 33, characterized in that the holding arrangement (40, 40a) can be tilted by the angle (φ) in various directions relative to the scanning arrangement.

35. The holding device as claimed in claim 33 or 34, characterized in that the holding arrangement (40, 40a) has an axle (40) which is mounted tiltably in all directions in a receiving arrangement (53, 54) formed by a sphere (53) and a counterbearing (54).